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### Original Article

## Clinical Features and Laboratory Findings of Visceral Leishmaniasis in Children Referred To Children Medical Center Hospital, Tehran, Iran during 2004-2011

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<p>Received 04 Aug 2013 Accepted 21 Nov 2013</p>	<p><b>Abstract</b></p> <p><b>Background:</b> Visceral leishmaniasis (VL) is one of the most important parasitic diseases endemic in northwestern and southern areas of Iran. The aim of the present study was to review the records of children hospitalized with VL in order to characterize the clinical features of children as well as laboratory finding in Children Medical Center Hospital, Tehran, Iran.</p> <p><b>Methods:</b> The medical records of all children with a final diagnosis of VL were reviewed from 2004 to 2011. Demographic, clinical information, laboratory finding and treatment were considered.</p> <p><b>Results:</b> A total number of 34 children with confirmed VL through 2004-2011 were included in the study. The most prevalent sign and symptoms were fever (97.1%), pallor and weakness (97.1%), appetite loss (61.8%), splenomegaly (97.1%) and hepatomegaly (88.2%). The most frequent laboratory abnormalities were hematological including anemia (97.1%), thrombocytopenia (91.2%) and leukopenia (67.6%). Direct agglutination test (DAT) was performed in 23 cases and all of them showed anti-<i>Leishmania</i> antibodies with titers of <math>\geq 1:3200</math>. In addition, 90% of patients had positive rK39 results. Identification of <i>Leishmania</i> in the aspirates of the bone marrow was found in 83.3% of patients.</p> <p><b>Conclusion:</b> Regional surveillance system in order to monitoring of leishmaniasis trends as well as detection of new emerging foci is recommended.</p>
<p><b>Keywords</b> Visceral leishmaniasis, Children, Iran</p>	
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## Introduction

Leishmaniasis is considered as a main public health problem in the Eastern Mediterranean Region of the World Health Organization (WHO) included in the list of neglected tropical diseases targeted for elimination by 2015 (1).

The disease manifests as three types including cutaneous, mucocutaneous, and visceral leishmaniasis (VL), also known as kala-azar. VL is the most severe form characterized by prolonged fever, splenomegaly, hyper gammaglobulinemia and pancytopenia (2).

VL has been occurred in 88 countries and about 500 000 new cases has been reported each year (2, 3). The majority of cases (90%) occur in agricultural areas particularly suburban of six countries including Bangladesh, India, Sudan, South Sudan and Brazil and Ethiopia (1, 4, 5). VL is also common in the northern part of the Mediterranean basin and Iran is one of the Eastern Mediterranean Region that VL might occur principally (6).

A VL elimination program was launched by The WHO South-East Asia Region in 2005 (7-9). The development of diagnostics to guide the treatment is the first step to achieve the goal of VL elimination (10). VL is one of the most important parasitic diseases endemic in northwestern and southern areas of Iran (11-13).

The aim of the present study was to review the records of children hospitalized with VL in order to characterize the clinical features of children as well as laboratory finding in Children Medical Center Hospital, Tehran, Iran.

## Materials and Methods

The medical records of all children referred to Children Medical Center Hospital with a final diagnosis of VL were reviewed from 2004 to 2011.

Inclusion criteria were a positive direct agglutination test (DAT) result (14, 15) and/or

the presence of *Leishmania* in the aspirates of the bone marrow and/or the rK39-based rapid diagnostic test (Cypress Diagnostic Company, Belgium) result (16).

Demographic and clinical information including age, sex, signs and symptoms of persistent systemic infection such as fever, fatigue, loss of appetite, weight loss, physical examination findings and treatment was considered. Laboratory records were reviewed for complete blood count (CBC) with differential and erythrocyte sedimentation rate (ESR).

The descriptive analysis was made through the distribution of frequency, mean and confidence interval of 95% (95% CI), according to the variable type.

## Results

A total number of 34 children with confirmed VL through 2004-2011 were included in the study.

The mean age of these patients were  $26.9 \pm 18.9$  months (range from 6 to 92 months) and 91.2% of them were under the age of 5 years. The male to female ratio was 0.8 and there was no statistically significant difference in gender over time. The mean length of hospital stay was  $13 \pm 5.7$  days. The majority of VL occurred in spring (35.3%), summer (29.4%), the late winter (26.5%), while a few was seen in autumn (8.8%).

The most prevalent symptoms were fever (97.1%), pallor and weakness (97.1%) and appetite loss (61.8%). The most frequent signs at admission were splenomegaly (97.1%) and hepatomegaly (88.2%) (Table 1).

The most frequent laboratory abnormalities were hematological including anemia (97.1%), thrombocytopenia (91.2%) and leukopenia (67.6%) (Table 2). Albumin  $<3$  g/dL and globulin was  $>3.5$  g/dL was found in 60% and 50% of patients, respectively. The majority of patients lived in Tehran (13 cases,

39.6%), the capital city of Iran, followed by 23.5% (8 cases) in Alborz, a province situated northwest of Tehran, and 11.8% (4 cases) in Lorestan, a Province of western Iran (Table 3).

**Table 1:** The frequency of clinical features in 34 children with VL in an Iranian referral Hospital during 2004-2011

Symptoms/signs	No. of patients	(%)
Fever	33	97.1
Loss of appetite	21	61.8
Weight loss	17	50
Pallor	33	97.1
Splenomegaly	33	97.1
Hepatomegaly	30	88.2
Lymphadenopathy	7	20.6
Jaundice	2	5.9
Edema	2	5.9

**Table 2:** Laboratory profiles of 34 children with VL in an Iranian referral hospital during 2004-2011

Parameter	Mean ± standard deviation
WBC (/mm <sup>3</sup> )	4681.7± 3521.3
Hemoglobin (%)	7.25± 1.44
Platelets (10 <sup>3</sup> /mm <sup>3</sup> )	95.5± 97.9
ESR (mm in first hour)	65.09± 33.1

WBC: white blood cell

ESR: Erythrocyte sedimentation rate

**Table 3:** Geographical distribution of VL cases hospitalized in an Iranian referral hospital during 2004-2011

Province	n	(%)
Tehran	13	38.2
Alborz	8	23.5
Lorestan	4	12.3
Markazi	2	5.8
Semnan	1	2.9
South Khorasan	1	2.9
Qazvin	1	2.9
Ilam	1	2.9
Sistan and Baluchistan	1	2.9
East Azerbaijan	1	2.9
West Azerbaijan	1	2.9
Total	34	100

The time between onset of symptoms and start of treatment ranged from 10 to 270 days, with mean of 59.6± 58.4. Thirty two patients (94%) had been treated with glucantime, with average administration time of 13±5.7 days (4-24 days). Only 2 children (6%) started treatment with amphotericin B deoxycholate due to elevated creatinine.

DAT was performed in 23 cases and all of them showed anti-*Leishmania* antibodies with titers of ≥ 1: 3200. In addition, among 20 patients which rK39 was performed, 18 children (90%) had positive results. Identification of *Leishmania* in the aspirates of the bone marrow was found in 25 patients (83.3%, among 30 patients). The mortality rate of VL in this study was 5.5%.

## Discussion

Efficient case management consider as a key factor in order to limiting morbidity and preventing mortality, controlling the reservoir and transmission (6). In our study, 91% of the children were under 5 years of age, with a mean age of 26.9 months, which was similar to other studies (7, 12, 17).

Serum albumin was low in 60% of patients that might be due to chronic infection and malnutrition (12). Similar to other studies, anemia, leukopenia and thrombocytopenia were the most prevalent hematological findings. High frequency of anemia might be due to a combination of iron deficiency, hemolysis and bone marrow suppression (3, 12).

The reported case-fatality rate for VL is extremely sparse and generally represents hospital-based deaths (range from 1.5% to 7.2%) (5). The mortality in this series was similar to those in previously published reports (5, 12).

The spread of this disease is highly correlated with certain ranges of temperature, rainfall, humidity and normalized difference vegetation index (18). Seasonal variation was observed in this study including peaking in spring and declining sharply in autumn. This

might be due to the incubation period of VL as well as the sand flies activation period (19). In addition, poverty is another major determinant for VL, it has been reported that most VL patients and threatened communities live in poverty-stricken regions with poor access to hygiene (7). Although geographical distribution of leishmaniasis is limited to the areas of natural distribution of the sand fly, the economic development including widespread urbanization besides migration from rural to urban areas, is responsible for the spread of the sand fly as well the reservoir system of *Leishmania* (20, 21). According to our results, all the patients had positive DAT test. In addition, in our study positive rK39 and identification of *Leishmania* in the bone marrow aspirates was seen in 90% and 83.3% of cases, respectively; therefore, it seems that the best diagnostic test for diagnostic of VL is DAT.

DAT was more specific (72-100%) and sensitive (92-100%), and used particularly in endemic areas of the world (11). Moreover, the rK39 dipstick test, with a sensitivity of 97% to 100% and a specificity of 86% to 92%, was found to be accurate and reliable test especially when used in combination with a clinical case definition (7, 22, 23).

Because it is a retrospective study, lack of information, either by lack of the information or lack of systematic record could consider as main limitation.

## Conclusion

Regional surveillance system in order to monitoring of leishmaniasis trends as well as detection of new emerging foci is recommended. In addition, vector and reservoir control as well as increase in public awareness with regard to safety measures should be implemented.

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The authors declare that there is no conflict of interests.

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